



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,431	07/29/2003	Ulrich Wegmann	Q76579	5290

23373 7590 09/25/2006

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER

LYONS, MICHAEL A

ART UNIT PAPER NUMBER

2877

DATE MAILED: 09/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/628,431

Applicant(s)

WEGMANN ET AL.

Examiner

Michael A. Lyons

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 11-26 and 28-37 is/are pending in the application.
- 4a) Of the above claim(s) 7 and 15-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8, 11, 12, 14, 28-35 and 37 is/are rejected.
- 7) ☒ Claim(s) 13 and 36 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 June 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because the drawings still contain hand-drawn element numbers and labels. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-6 and 28-32 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Regarding claims 1 and 28, merely determining the influencing of the state of polarization of the optical system by means of evaluating the measured exit state of polarization with reference to the entrance state of polarization would not appear to be sufficient to constitute a tangible result, since the outcome of the determination step has not been used in a disclosed practical application nor made available in such a manner that its usefulness in a disclosed practical application can be realized. See OG Notices: 22 November 2005, "Interim Guidelines for Examination of Patent Applications for Subject Matter Eligibility".

In particular, sentence 3 in the OG Notice from 22 November 2005 states, "In determining whether the claim is for a 'practical application', the focus is not on whether the

Art Unit: 2877

steps taken to achieve a particular result are useful, tangible, and concrete, but rather that the final result achieved by the claimed invention is 'useful, tangible, and concrete'".

To clarify the above, in the way claims 1 and 28 are presented, it would appear at a glance that the determination step may not be the final result of the claim. However, in the opinion of the examiner, the wherein statements after the determination steps of claims 1 and 28 merely serve to further limit the already disclosed limitations of claims 1 and 28. As a result, the determination step is the final result achieved by the method of the claimed invention, and as determining fails to achieve a concrete, tangible result, the claims are rejected as being non-statutory.

As for the dependent claims (2-6 and 29-32), these claims also only serve to further limit the already stated limitations of the claims on which they depend. As they fail to further produce a concrete, tangible result, the claims are also rejected as being non-statutory for the reasons as given above with regards to claim 1 (claims 2-6) and claim 28 (claims 29-32).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

Regarding claim 1, Ouchi (Figs. 1 and 2) discloses a method for determining the influencing of the state of polarization of optical radiation by an optical system, the method comprising directing entrance side radiation with a defined entrance state of polarization onto the optical system (1, 2, paragraph [0012]), measuring the exit state of polarization with radiation emerging from the optical system (8, 9, paragraph [0012]), and determining the influencing of the state of polarization by the optical system by means of evaluating the measured exist state of polarization with reference to the entrance state of polarization (102, 103, paragraph [0012])0,

wherein the influencing of the state of polarization caused by the optical system of prescribable aperture is determined with pupil resolution (paragraph [0015]).

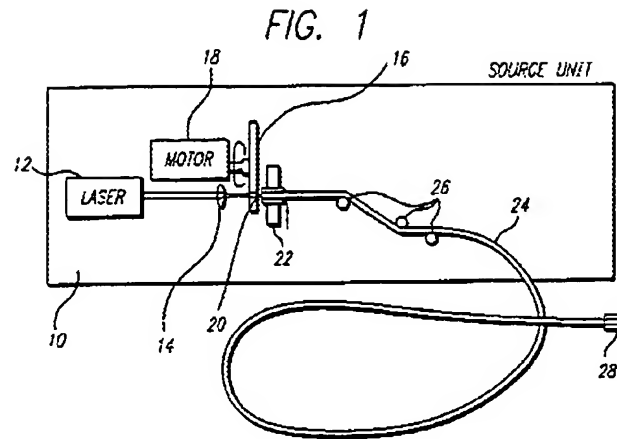
Ouchi, however, fails to disclose an explicit ellipsometry measurement that is carried out in association with the above method.

In operation of the Ouchi device, however, as light starts through the system, it is linearly polarized. As this light interacts with the system under test and the reflecting mirror (elements 5 and 6 in Fig. 1), the light loses its linear polarization and gains elliptical polarization (see Figure 2; an ellipsometry method, such as the one disclosed by Spanier, acts by “measuring the change in polarization of light upon interaction with a sample for determining characteristics of the sample” (Col. 1, lines 7-9 of Spanier).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include an ellipsometry measurement to the device of Ouchi as per Spanier, the motivation being that the ellipsometry measurement will provide a more accurate, more efficient measurement of the polarization change of the light in the device from linear to elliptical, thereby providing a more accurate indication of the characteristics of the optical sample being measured by the device as a whole.

As for claim 2, the defined entrance state of polarization is provided in an object plane of the imaging system, and the exit state of polarization is measured with pupil resolution within a prescribable pupil range of the imaging system (see paragraphs [0012], [0015]).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ouchi (2002/0024673) as applied to claim 1 above, and further in view of Frieschlad (6,061,133).



As for claim 3, Ouchi discloses the claimed invention except for a spatially incoherent point light radiation emanating from the object plane of the optical system is provided as entrance-side radiation.

Freischlad (Fig. 1) discloses a light source for an interferometer that passes light from laser 12 through a rotating diffuser disk 16. By passing the light through the diffuser, the laser light becomes spatially incoherent.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add a diffuser between the light source and optical system of Ouchi as per Freischlad to provide spatially incoherent light to the optical system, the motivation being that using spatially incoherent light will spread out the light source over a broader spatial range, allowing for more of the system to be measured simultaneously in one measurement due to the increased spatial resolution of a spatially incoherent light source.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ouchi (2002/0024673) as applied to claim 1 above, and further in view of Cyr (6,204,924).

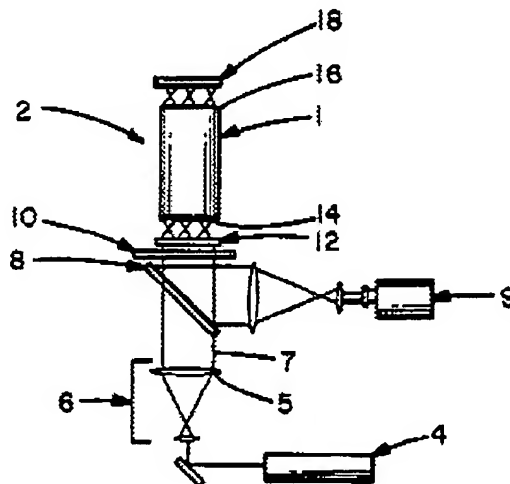
Art Unit: 2877

As for claim 4, Ouchi discloses the claimed invention except for the measurement of the exit state polarization including a determination of a Jones matrix.

Cyr, however, discloses a device that measures polarization mode dispersion of optical devices. Cyr discloses that once light has passed through the optical system, Jones matrix eigenanalysis may be performed to determine the polarization of the light after having passed through the optical system.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to perform Jones matrix analysis on the polarized light output by the Ouchi device as per Cyr, the motivation being that Jones analysis is shown to be a well known, accurate method of performing polarization analysis for an optical system under test (Col. 1, lines 42-53 of Cyr).

Claims 8, 12, 33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ouchi (2002/0024673) in view of LaFleur (5,815,268).



Regarding claim 8, Ouchi (Fig. 1) discloses an apparatus for determining the influencing of the state of polarization of optical radiation by an optical system, the system comprising means for providing entrance side radiation directed onto the optical system with a defined state of polarization (1, 2, paragraph [0012]), polarization detector means for measuring the exit state of polarization of radiation emerging from the optical system (8, 9, paragraph [0012]), and an evaluation unit for determining the influencing of the state of polarization by the optical system by means of evaluating the measured exit state of polarization with reference to the entrance state of polarization (10, paragraph [0012]), wherein the polarization detector means is configured to measure the exit state of polarization with pupil resolution, the evaluation unit is configured to determine the influencing state of polarization with pupil resolution (paragraph [0015]), and the means for providing the entrance side radiation including a first polarization means that is upstream from the optical system, these polarization means including a polarizer unit 2 that can be set to various spatial orientations via rotator 13 (paragraph [0012]).

Ouchi, however, fails to disclose a perforated mask in an object plane of the optical system.

LaFleur (Figs. 1 and 2) discloses a binary optic 12 that generates an array of point sources 13 of the appropriate f-stop number for the optical system 1 being tested; this acts as a perforated mask (Col. 2, lines 23-33).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add a mask to the device of Ouchi as per LaFleur, the motivation being that the mask, by dividing the input light into an array of sources, will enable the device to

measure the optical system under test at a variety of positions throughout the system simultaneously (Col. 1, lines 22-24).

Regarding claim 33, Ouchi (Fig. 1) discloses an apparatus for determining the influencing of the state of polarization of optical radiation by an optical system, the system comprising means for providing entrance side radiation directed onto the optical system with a defined state of polarization (1, 2, paragraph [0012]), polarization detector means for measuring the exit state of polarization of radiation emerging from the optical system (8, 9, paragraph [0012]), and an evaluation unit for determining the influencing of the state of polarization by the optical system by means of evaluating the measured exit state of polarization with reference to the entrance state of polarization (10, paragraph [0012]), wherein the polarization detector means is configured to measure the exit state of polarization with pupil resolution, the evaluation unit is configured to determining the influencing state of polarization with pupil resolution (paragraph [0015]), and the means for providing the entrance side radiation including a first polarization means that is upstream from the optical system (2, paragraph [0012]).

Ouchi, however, fails to disclose a perforated mask in an object plane of the optical system.

LaFleur (Figs. 1 and 2) discloses a binary optic 12 that generates an array of point sources 13 of the appropriate f-stop number for the optical system 1 being tested; this acts as a perforated mask (Col. 2, lines 23-33).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add a mask to the device of Ouchi as per LaFleur, the motivation being that the mask, by dividing the input light into an array of sources, will enable the device to

measure the optical system under test at a variety of positions throughout the system simultaneously (Col. 1, lines 22-24).

As for claims 12 and 35, Ouchi further discloses polarization detector means including a camera 9 and second polarization means in the form of analyzer 8 upstream from the detector.

Ouchi, however, fails to disclose the camera being a CCD detector.

Official Notice is taken, however, as to the well known use of CCD cameras as detectors in optical interferometry, and it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a CCD camera in place of the generic camera of the combined device, the motivation being that the CCD camera provides imaging in a smaller, more efficient manner than a generic camera.

Claims 11 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ouchi (2002/0024673) and LaFleur (5,815,268) as applied to claims 8 and 33 above, and further in view of Freischlad (6,061,133).

As for claims 11 and 34, the combined device of Ouchi and LaFleur discloses the claimed invention except for a diffusing screen in front of the first polarization means.

Freischlad (Fig. 1) discloses a light source for an interferometer that passes light from laser 12 through a rotating diffuser disk 16. By passing the light through the diffuser, the laser light becomes spatially incoherent.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add a diffuser between the light source and optical system of Ouchi and LaFleur as per Freischlad to provide spatially incoherent light to the optical system, the motivation being that using spatially incoherent light will spread out the light source over a

broader spatial range, allowing for more of the system to be measured simultaneously in one measurement due to the increased spatial resolution of a spatially incoherent light source.

Claims 14 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ouchi (2002/0024673) and LaFleur (5,815,268) as applied to claims 8 and 33 above, and further in view of Cyr (6,204,924).

As for claims 14 and 37, the device of Ouchi and LaFleur discloses the claimed invention except for the evaluation unit being configured to determine a Jones matrix.

Cyr, however, discloses a device that measures polarization mode dispersion of optical devices. Cyr discloses that once light has passed through the optical system, Jones matrix eigenanalysis may be performed to determine the polarization of the light after having passed through the optical system.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to perform Jones matrix analysis on the polarized light output by the Ouchi and LaFleur device as per Cyr, the motivation being that Jones analysis is shown to be a well known, accurate method of performing polarization analysis for an optical system under test (Col. 1, lines 42-53 of Cyr).

Claims 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ouchi (2002/0024673) in view of Freischlad (6,061,133).

Regarding claim 28, Ouchi (Fig. 1) discloses a method for determining the influencing of the state of polarization of optical radiation by an optical system, the method comprising directing entrance side radiation with a defined entrance state of polarization onto the optical system (1, 2, paragraph [0012]), measuring the exit state of polarization with radiation emerging

from the optical system (8, 9, paragraph [0012]), and determining the influencing of the state of polarization by the optical system by means of evaluating the measured exist state of polarization with reference to the entrance state of polarization (102, 103, paragraph [0012]0, wherein the influencing of the state of polarization caused by the optical system of prescribable aperture is determined with pupil resolution (paragraph [0015])).

Ouchi, however, fails to disclose the use of spatially incoherent point light radiation as the entrance side radiation.

Freischlad (Fig. 1) discloses a light source for an interferometer that passes light from laser 12 through a rotating diffuser disk 16. By passing the light through the diffuser, the laser light becomes spatially incoherent.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add a diffuser between the light source and optical system of Ouchi as per Freischlad to provide spatially incoherent light to the optical system, the motivation being that using spatially incoherent light will spread out the light source over a broader spatial range, allowing for more of the system to be measured simultaneously in one measurement due to the increased spatial resolution of a spatially incoherent light source.

As for claim 29, Ouchi discloses that the defined entrance state of polarization is provided in an object plane of the imaging system, and the exit state of polarization is measured with pupil resolution within a prescribable pupil range of the imaging system (see paragraphs [0012], [0015]).

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ouchi (2002/0024673) and Freischlad (6,061,133) as applied to claim 28 above, and further in view of Cyr (6,204,924) and Spanier et al (5,166,752).

As for claim 30, the device of Ouchi and Freischlad discloses the claimed invention except for the measurement of the exit state polarization including a determination of a Jones matrix along with an associated ellipsometric measurement.

Cyr, however, discloses a device that measures polarization mode dispersion of optical devices. Cyr discloses that once light has passed through the optical system, Jones matrix eigenanalysis may be performed to determine the polarization of the light after having passed through the optical system.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to perform Jones matrix analysis on the polarized light output by the Ouchi and Freischlad device as per Cyr, the motivation being that Jones analysis is shown to be a well known, accurate method of performing polarization analysis for an optical system under test (Col. 1, lines 42-53 of Cyr).

As for the ellipsometry measurement, in operation of the combined device, as light starts through the system, it is linearly polarized. As this light interacts with the system under test and the reflecting mirror (elements 5 and 6 in Fig. 1 of Ouchi for example), the light loses its linear polarization and gains elliptical polarization (see Figure 2; an ellipsometry method, such as the one disclosed by Spanier, acts by “measuring the change in polarization of light upon interaction with a sample for determining characteristics of the sample” (Col. 1, lines 7-9 of Spanier).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include an ellipsometry measurement to the combined device as per Spanier, the motivation being that the ellipsometry measurement will provide a more accurate, more efficient measurement of the polarization change of the light in the device from linear to elliptical, thereby providing a more accurate indication of the characteristics of the optical sample being measured by the device as a whole.

Allowable Subject Matter

Claims 5-6 and 31-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and if the 35 USC 101 rejection above is also properly overcome.

Claims 13 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As to claims 5, 13, 31, and 36, the prior art of record, taken either alone or in combination, fails to disclose or render obvious the further limitation of the claimed method or apparatus, the further limitation including either a shearing interferometer unit or a point-diffraction interferometry unit, these units being used to measure and evaluate the exit state of polarization within the device as a whole, in combination with the rest of the limitations of the above claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Lyons whose telephone number is 571-272-2420. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley can be reached on 571-272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read "Michael A. Lyons", followed by a large, stylized circular flourish.

Michael A. Lyons
Patent Examiner
September 18, 2006